Title: **Reaction to non-scheduled news during financial crisis: Australian evidence**

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Abstract: News analytics software applies linguistic algorithms to news-wire releases in order to assign a sentiment score; this allows users to comprehend the unstructured data flowing through news-wires. I examine the market reaction of leading Australian stocks to stock-specific news flow during the financial crisis of 2007-2009. A high-frequency VAR model finds a significant market impact induced by contemporaneous news items, a significant and positive relationship between the measures of trading activity and volatility, and an increase in bid-ask spreads following periods of increased volatility.

I. Introduction

Market efficiency is an important topic in the field of financial economics, hypothesising that all currently available public, and private, information should be reflected in share prices; thus market participants should only respond to new information (news). The flow of news has greatly increased in recent times, and this makes it costly for market participants to process all relevant news items. As a result, an increasing number of market participants rely on pre-processed news analytics software to trade in relation to non-scheduled news announcements.

Antweiler and Frank (2004) and Tetlock (2007) are among the first to employ linguistic analysis to quantify the tone of news releases and identify common patterns in firm and market responses. Dzielinski (2011) utilizes sentiment signed news to directly compare news and no-news stock returns, finding that positive (negative) news results in above (below) average returns whilst the effect of neutral news is non-distinguishable from the no-news average. Sinha (2011) gauges the tone of news articles and constructs a measure to predict future returns, while Smales (2013) finds a positive relationship between the investor fear gauge (VIX) and news sentiment that is more intense during period of market stress.

This study seeks to examine the interdependency of a number of key market variables in the presence of non-scheduled news announcements, during a crisis-period of intense interest to academic scholar and market participants. Using a sample of 33 highly-liquid ASX50 stocks, over a 26-month time period, 104,121 news announcements are examined. Study suggests that news with negative and positive sentiment has a greater impact than news designated as neutral. Analysis of market dynamics and cross-dependencies between variables in a VAR framework discovers a significant market impact induced by contemporaneous news items and also reveals a significant and positive relationship between measures of trading activity and volatility. Prior trading periods of rising market activity and volatility result in widening bid-ask spreads.

II. Data

Several information vendors offer software that captures the important characteristics in real-time[1]. The software uses pattern recognition algorithms to analyse the text of news releases to infer tone and sentiment. In this study, processed news data, posted on the Dow Jones newswire, is gathered from a software tool named RavenPack[2]. In total, there are 104.121 news headlines for the sample stocks I consider over the period 09 Aug 2007 to 01 Sep 2009[3], with news arrival recorded with millisecond precision. News Sentiment scores of -1,0,+1 are assigned to stories classified as negative, neutral, and positive using a measure termed *Multi-Classifier for Equities* (MCQ)[4].

To enable a high-frequency study of market dynamics it is necessary to ensure that the stocks covered within the analysis are liquid and thus I focus on the stocks which make up the ASX50; the leading 50 domestic stocks by market capitalisation trading on the Australian Securities Exchange (ASX). The sample is reduced to 33 after removal of those stocks not members of the index for the entire sample period. Descriptive statistics are provided in Table 1; covering 75.7% of Australian market capitalization, the sample can be considered as being representative of the overall stock market. It is of little surprise that returns are negative on

[1] This processed data is available to market participants (at a cost) almost instantaneously; academic researchers are able to access this information only at a later stage – usually several months afterwards.

[2] More extensive information on the nature of the RavenPack news analytics tool may be found at www.ravenpack.com

[3] 09 August 2007 is the day on which AIG issued a warning that credit defaults were spreading beyond the subprime sector, and coordinated intervention by major central banks. 01 September 2009 corresponds with the return of credit market indicators to pre-crisis levels. The defined crisis period also approximately correspond to dates of structural breaks identified in a wider 2000-2011 sample.

[4] This score represents the news sentiment derived from the tone of a story using a combination of a Traditional Tagging Methodology that uses an algorithm to map key words and phrases to pre-defined sentiment values, and an Expert Consensus Methodology that entails training classification algorithms on the results of financial experts manually tagging stories.

average given the 12% fall in the overall stock market; however, it is more surprising that the proportion of positive stories is greater than that of negative stories.

<Insert Table 1>

Transaction data is obtained from Thomson Reuters Tick History and is aggregated into 30-second intervals. The following standardized variables are computed over 30-second intervals; standardization using the rolling six-month average of the corresponding underlying 30-second interval accounts for intraday patterns:

i) *Money value volume*, calculated as price multiplied by volume traded;

ii) *Volatility*, calculated using volatility of mid-point returns in each interval;

iii) *Absolute order imbalance*, defined as the absolute value of the difference in cumulated buyer- and seller- initiated trades;

iv) *Average trade size*, total volume divided by the corresponding number of trades;

v) *Bid-ask spread*, the average bid-ask spread over the given interval;

vi) *Returns*, calculated using the mid-point of the bid-ask quote;

III. Empirical Evidence

Relative impact of negative and positive news items

I first gain an insight into the impact of news on market activity by considering the unconditional impact of news-wire releases. I analyse 90 30-second intervals around the arrival of news items, capturing 30 intervals (15-minutes) before each disclosure and 60 intervals (30-minutes) afterwards. Figure 1 shows the average reaction in each of the variables to news items which have been disaggregated into negative, neutral, and positive news tone.

<Insert Figure 1>

Consistent with Dzielinski (2011), neutral news releases appears to result in no significant change in any of the variables around the time of the news release. In contrast, both positive and negative news releases elicit a sharp spike in the normalized variables. The above-average activities start at least 15-minutes prior to the release, move sharply higher in the 2-minutes immediately prior, and quickly revert to lower levels afterwards. Additionally, the measures for volume, order imbalance and volatility are higher in the case of negative news, particular in the 30 second intervals either side of the news release.

Figure 1c depicts cumulative abnormal returns[5] around negative and positive news events; starting 15 minutes *before* the disclosure significantly positive (negative) cumulated abnormal returns are observed as reactions to positive (negative) news items. However, whilst significant price movements are observed prior to news releases there are only limited return reactions thereafter; this points to the possibility of information leakage, although the magnitudes of returns are sufficiently small as to be non-profitable from a trading perspective once moderate transaction costs are considered.

VAR Model

A Vector Auto-Regression (VAR) specification models market dynamics for the endogenous variables (realized variance, the money traded value, the bid-ask spread, average trade size, absolute trade imbalance, and period return) around exogenous non-scheduled news releases:

$$y_t = c + \sum_{i=1}^{p} (\Gamma_i y_{t-i}) + \Xi \cdot D_t + \varepsilon_t, \qquad \varepsilon_t \sim N(0, \Omega) \qquad (1)$$

[5] A three-factor CAPM is assumed when determining abnormal returns.

Where Γ_i and Ξ denote (6 x 6) and (6 x (p_1+p_2+1)) coefficient matrices, and where $p_1 > 0$ and $p_2 > 0$ are integers. To capture the impact of news the dummy variable d_t is defined, taking a value one in case of relevant news in t and zero otherwise. Then, $D_t = (d_{t+p1}...d_{t-p2})'$ is a vector of time dummies indicating the arrival of high relevance news and covering p_1 intervals before and p_2 intervals after news releases. The VAR model is applied to each of the 33 stocks in the sample. Akaike Information Criteria is utilised to obtain optimal lag length; results for the first two lags are reported. Table 2 reports average estimates for the VAR model augmented with dummies indicating the arrival of relevant news items.

<Insert Table 2>

The reported results are robust to the ordering of the variables. First, there is significant positive own dynamics for all variables apart from returns. Second, lagged volume is positively related with absolute returns, no other variable exhibits a relationship with returns. Third, there is a significant positive relationship between the variables concerned with trading activity (Volume and Order Imbalance), and average trade size. Fourth, a significant and positive relationship is observed between the measures of trading activity and volatility.

Consistent with microstructure theory, there is an increase in bid-ask spreads if prior trading periods reflect increasing volatility and order imbalances. Since such situations are also characterized by declining trade size there is evidence that informed traders are attempting to disguise their intentions when in possession of valuable news. In response to increased trading costs (indicated by higher bid-ask spreads) trading activity (Volume and Trade Size) is reduced. Supportive of the effects highlighted in Figure 1, significant effects induced by contemporaneous news items are identified for Volume, Volatility and Abs. Order Imbalance. Once the news item

has been released, the insignificance of News Dummy variables of greater than one lag indicates that the direct impact of news disappears quickly.

<Insert Table 3>

Table 3 reports the results of the Forecast Error Variance Decomposition relating to the VAR specification in Eq. (1); average results for the 33 stocks are reported. In general, the own-variable lags contribute most to the variance error for each variable. Unsurprisingly, since all three measure market activity, order imbalance and trade size are important in explaining volume. There is evidence of the inter-relationship between volatility, bid-ask spread, and trade size with bid-ask spread explaining 13% of the forecast variance of volatility, trade size explaining 13% of the forecast variance of bid-ask spread, and each of volatility and bid-ask spread explaining 48% of trade size.

<Insert Figure 2>

Figure 2 displays the Impulse response to the release of a news item on the Dow Jones newswire. Volume, Volatility, Order Imbalance, and Returns increase significantly in the immediate aftermath of a news item. Several of the variables display a hump-shaped response which is indicative of the time taken for news to disseminate through the market. The impact of news is relatively short-lived with Volatility returning to normal within approximately 2-minutes (4 x 30sec intervals) and the significant response of Volume, Order Imbalance and Returns lasting approximately 6-minutes (12 x 30 sec intervals).

IV. Conclusion

The quantity of news available to financial market participants has increased tremendously in recent years; such vast amounts of information create noise alongside data

relevant to the price of an asset. Such effects have made it difficult to identify a genuine linkage between the flow of news through the news-wire and trading activity. This article finds evidence to suggest that news analytics software performs a sound role in assigning sentiment scores (negative, neutral, or positive) to newswire messages; news designated as negative or positive tends to have a much greater impact on the market than does neutral news.

Analysis of market dynamics and cross-dependencies between variables in a VAR framework confirms the significant market impact induced by contemporaneous news items; with a particularly strong relationship between news and market activity measures. This framework also reveals a significant and positive relationship between the measures of trading activity and volatility. Finally, there is an increase in bid-ask spreads if prior trading periods reflect rising market activity and volatility. The results are consistent with the empirical evidence presented by Groß-Klußmann and Hautsch (2011) for the London stock market, and are supportive of microstructure theory.

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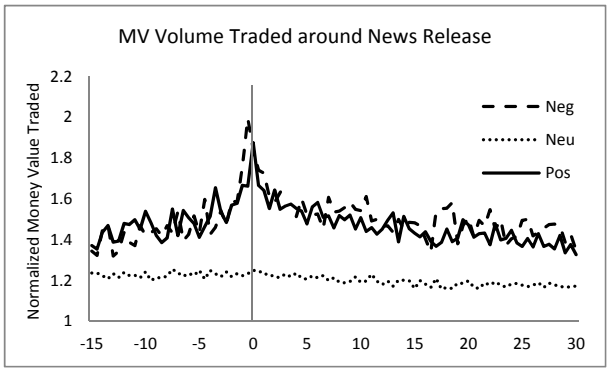


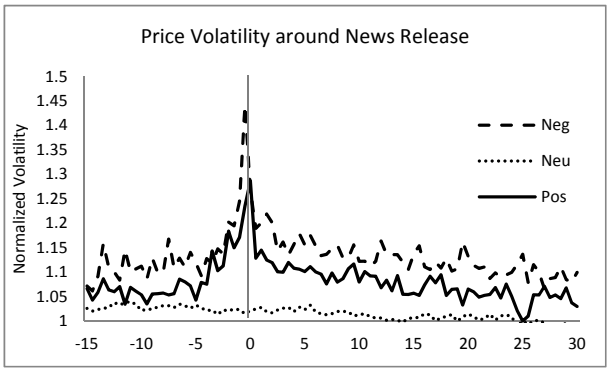
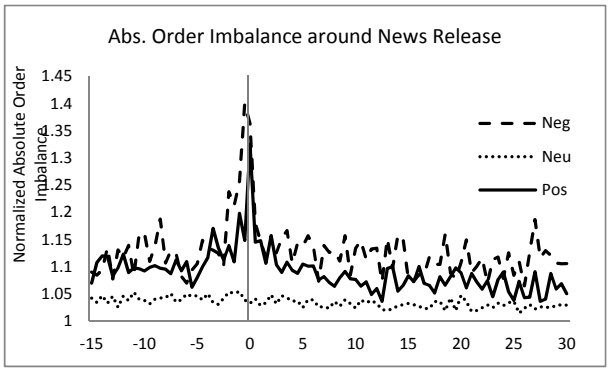


Fig. 1a. Money Value Traded and Volatility around positive and negative news releases.



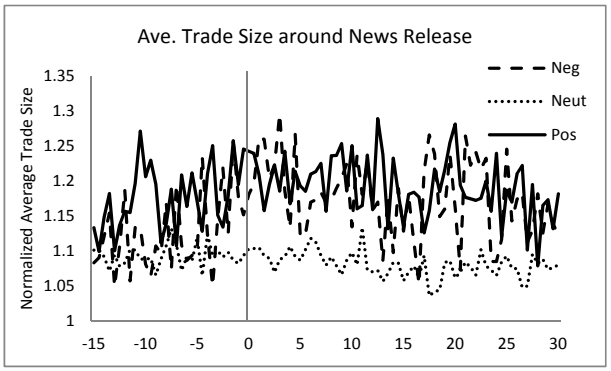
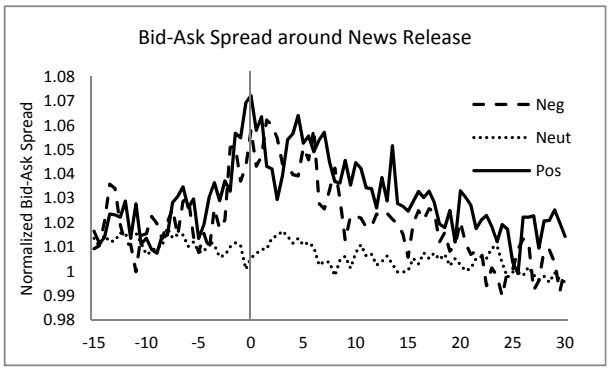


Fig. 1b. Order Imbalance and Average Trade Size around positive and negative news releases.



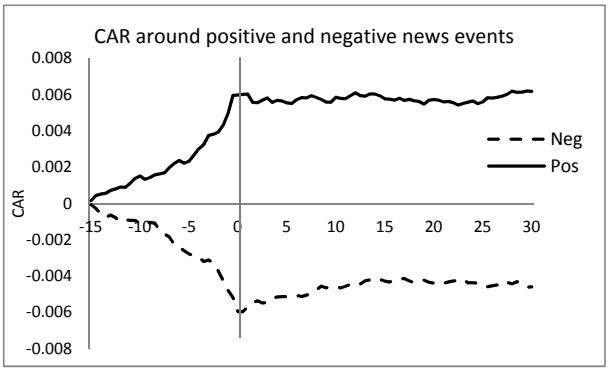


Fig. 1c. Bid-Ask Spread and Cumulative Abnormal Returns (CAR) around positive and negative news releases.

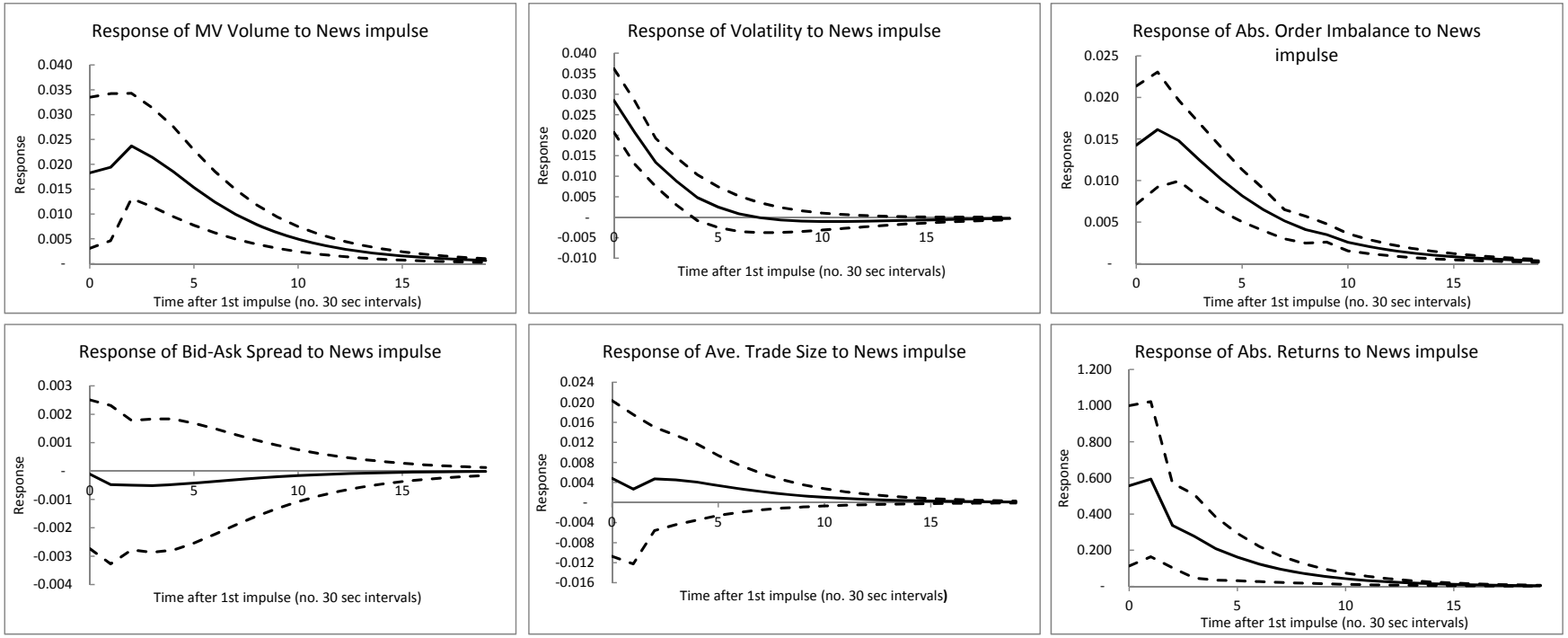


Fig 2. Response analysis of a change in the news dummy for highly relevant news items

Table 1

Descriptive Statistics

RIC	GICS	M. Cap in % of All Ord Index	Money Value Volume	Price	Return	Spread	No. Trades	No. News Items	Neg. News	Pos. News	% Neg	% Pos
AMC	15	0.75%	22,131,059	5.95	0.246	0.012	2,347	547	97	114	17.7%	20.8%
AMP	40	1.00%	50,626,229	7.03	-0.153	0.012	3,182	569	97	126	17.0%	22.1%
ANZ	40	5.01%	200,635,023	20.16	-0.019	0.015	7,936	7,680	895	978	11.7%	12.7%
ASX	40	0.47%	35,453,185	37.98	-0.147	0.036	3,228	1,720	121	141	7.0%	8.2%
BHP	15	15.20%	617,936,814	36.72	-0.051	0.015	13,230	13,394	997	1,906	7.4%	14.2%
CBA	40	6.58%	218,359,521	42.73	-0.005	0.023	7,725	8,757	505	771	5.8%	8.8%
CCL	30	0.79%	32,656,226	8.81	0.220	0.014	2,379	813	84	163	10.3%	20.0%
CPU	45	0.39%	18,757,166	8.74	0.059	0.015	2,281	3,490	55	72	1.6%	2.1%
CSL	35	1.56%	84,458,204	41.04	-0.067	0.033	5,302	519	72	168	13.9%	32.4%
GPT	40	0.48%	41,941,384	2.17	-0.343	0.008	2,056	553	138	108	25.0%	19.5%
ILU	15	0.59%	8,621,952	4.19	0.144	0.014	1,467	639	107	136	16.7%	21.3%
LEI	20	0.59%	35,266,351	38.18	-0.089	0.041	3,382	1,183	118	431	10.0%	36.4%
LLC	40	0.31%	19,955,920	11.10	-0.091	0.019	2,011	643	121	152	18.8%	23.6%
MGR	40	0.35%	22,855,505	2.91	-0.200	0.010	1,711	522	122	137	23.4%	26.2%
NAB	40	4.60%	229,268,852	27.78	-0.045	0.018	8,016	11,123	495	607	4.5%	5.5%
NCM	15	1.82%	82,653,513	29.96	-0.037	0.029	4,899	3,971	164	280	4.1%	7.1%
ORG	10	1.20%	52,170,821	13.18	-0.161	0.016	3,288	1,439	136	251	9.5%	17.4%
ORI	15	0.82%	32,983,542	23.42	-0.049	0.030	3,050	630	95	131	15.1%	20.8%
OSH	10	0.77%	32,656,264	4.92	-0.032	0.012	2,139	329	50	119	15.2%	36.2%
QAN	20	0.31%	55,114,765	3.46	-0.156	0.010	2,246	2,395	274	344	11.4%	14.4%
QBE	40	1.26%	104,529,037	24.97	-0.109	0.021	5,547	814	93	187	11.4%	23.0%
RIO	15	10.13%	239,420,799	92.99	0.009	0.047	7,868	16,093	907	1,896	5.6%	11.8%
SGP	40	0.58%	42,875,625	5.48	0.014	0.013	2,513	875	148	126	16.9%	14.4%
SHL	35	0.40%	19,687,103	13.87	-0.115	0.019	2,423	340	38	158	11.2%	46.5%
STO	10	1.10%	60,650,174	15.28	-0.054	0.019	4,132	944	136	313	14.4%	33.2%
SUN	40	0.88%	48,731,466	11.95	-0.186	0.016	3,317	848	107	123	12.6%	14.5%
TCL	20	0.68%	20,416,448	5.53	0.086	0.013	2,085	294	65	98	22.1%	33.3%
TLS	50	3.50%	194,406,983	4.09	-0.098	0.010	3,866	2,996	348	229	11.6%	7.6%
TOL	20	0.34%	34,259,912	8.37	-0.221	0.014	2,689	530	52	142	9.8%	26.8%
WBC	40	5.54%	199,484,555	22.32	-0.023	0.015	7,709	14,335	733	938	5.1%	6.5%
WES	20	2.82%	87,891,425	30.09	-0.230	0.024	4,966	1,815	181	286	10.0%	15.8%
WOW	30	2.62%	101,343,712	27.95	-0.051	0.020	5,363	1,210	79	236	6.5%	19.5%
WPL	10	2.29%	115,671,965	47.12	-0.047	0.034	5,721	2,111	223	300	10.6%	14.2%
Sum		75.72%	95,874,894		- 0.060	0.020	4,245	104,121	7,853	12,167	7.5%	11.7%

Sample Period: 09 Aug 2007 - 01 Sep 2009

Table 2

Panel A - Average VAR results

		Abs. Order Imbalance		Ave. Trade Size		Bid-Ask Spread		Returns		Volatility		Volume	
Dynamics													
	c	0.930	***	0.890	***	0.615	***	10.331		0.609	***	0.888	***
		(0.014)		(0.008)		(0.002)		(13.35)		(0.003)		(0.005)	
Abs. Order Imbalance	OI_{t-1}	0.063	***	-0.029		-0.006		0.469		0.069		0.066	
		(0.002)		(0.037)		(0.008)		(3.925)		(0.127)		(0.252)	
	OI_{t-2}	0.032	*	-0.041		-0.016	*	0.873		-0.207		-0.126	
		(0.018)		(0.037)		(0.008)		(3.807)		(0.129)		(0.253)	
Ave. Trade Size	$AvTrade_{t-1}$	-0.011		0.008	**	-0.001		-0.321		-0.015	*	-0.028	*
		(0.011)		(0.004)		(0.001)		(2.885)		0.008		(0.016)	
	$AvTrade_{t-2}$	-0.012		0.004	*	0.005		-0.504		-0.012		-0.024	
		(0.012)		(0.003)		(0.005)		(2.913)		(0.007)		(0.017)	
Bid-Ask Spread	BAS_{t-1}	-0.015	***	-0.010		0.024	***	-0.584		0.016	***	-0.008	**
		(0.005)		(0.009)		(0.002)		(4.494)		(0.003)		(0.004)	
	BAS_{t-2}	-0.008		0.001		0.015	***	0.812		0.008	**	-0.006	
		(0.005)		(0.009)		(0.002)		(4.195)		(0.003)		(0.007)	
Period Returns	Ret_{t-1}	-0.007		-0.061		-0.009		-0.254		0.014		-0.012	
		(0.067)		(0.167)		(0.030)		(10.99)		(0.047)		(0.109)	
	Ret_{t-2}	-0.017		-0.023		0.013		0.215		0.024		0.001	
		(0.070)		(0.169)		(0.031)		(10.98)		(0.046)		(0.119)	
Volatility	Vol_{t-1}	0.023		0.085		0.027	**	0.896		0.138	***	0.075	**
		(0.029)		(0.061)		(0.013)		(4.000)		(0.021)		(0.031)	
	Vol_{t-2}	0.032		0.044		-0.012		-0.118		0.093	***	0.063	
		(0.029)		(0.062)		(0.014)		(3.244)		(0.021)		(0.004)	
Volume	$Volume_{t-1}$	0.018		0.053	*	0.014		0.092	**	0.011		0.104	***
		(0.015)		(0.033)		(0.009)		(0.034)		(0.011)		(0.022)	
	$Volume_{t-2}$	0.018		0.057	*	-0.005		0.019		0.001		0.089	***
		(0.015)		(0.032)		(0.007)		(0.035)		(0.011)		(0.022)	
News Dummies													
Item dummy	$News_t$	0.144	**	0.100		0.007		31.30	***	0.368	***	0.163	**
		(0.067)		(0.133)		(0.023)		(10.78)		(0.088)		(0.077)	
Dummy lags	$News_{t-1}$	0.141	**	0.060		0.003		-31.64		0.221	**	0.325	*
		(0.067)		(0.176)		(0.026)		(107.77)		(0.088)		(0.170)	
	$News_{t-2}$	0.011		0.062		0.023		-1.043		0.000		0.114	
		(0.063)		(0.130)		(0.021)		(87.42)		(0.072)		(0.082)	

Panel B - Average VECH(1,1) results

		Abs. Order Imbalance		Ave. Trade Size		Bid-Ask Spread		Returns		Volatility		Volume	
Abs. Order Imbalance	c_{i1}	0.1065	***										
		(0.0005)											
Ave. Trade Size	c_{i2}	0.0009		0.0031	***								
		(0.0007)		(0.0003)									
Bid-Ask Spread	c_{i3}	-0.0001		0.0038	***	0.0153	***						
		(0.0002)		(0.0002)		-0.0005							
Period Returns	c_{i4}	0.2017	***	-0.0006		0.0005		0.0005	***				
		(0.0002)		(0.0004)		(0.0036)		(0.0002)					
Volatility	c_{i5}	0.0498	***	0.0560	***	-0.0013		0.0206	***	0.0052	***		
		(0.0001)		(0.0003)		(0.0258)		(0.0002)		(0.0003)			
Volume	c_{i6}	0.0018		-0.0003		0.0022		0.0252	***	0.0051	***	0.0799	***
		(0.0023)		(0.0033)		(0.0029)		(0.0002)		(0.0001)		(0.0002)	
Abs. Order Imbalance	a_{i1}	0.025	***										
		(0.001)											
Ave. Trade Size	a_{i2}	0.019	***	0.061	***								
		(0.001)		(0.001)									
Bid-Ask Spread	a_{i3}	0.114	***	0.039	***	0.020	***						
		(0.008)		(0.002)		(0.000)							
Period Returns	a_{i4}	0.021	***	0.053	***	0.087		0.037	***				
		(0.004)		(0.003)		(0.062)		(0.000)					
Volatility	a_{i5}	0.019	***	0.197	***	0.197	***	0.127	***	0.063	***		
		(0.000)		(0.001)		(0.006)		(0.001)		0.003			
Volume	a_{i6}	0.127	***	0.232	***	0.116	***	0.081	***	0.041	***	0.024	***
		(0.008)		(0.006)		(0.012)		(0.003)		(0.001)		(0.000)	
Abs. Order Imbalance	b_{i1}	0.932	***										
		(0.001)											
Ave. Trade Size	b_{i2}	0.925	***	0.874	***								
		(0.002)		(0.004)									
Bid-Ask Spread	b_{i3}	0.694		0.898	***	0.933	***						
		(0.439)		(0.001)		(0.001)							
Period Returns	b_{i4}	0.954	***	0.785	***	0.738		0.921	***				
		(0.000)		(0.003)		(0.527)		(0.001)					
Volatility	b_{i5}	0.957	***	0.764	***	0.727	**	0.862	***	0.895	***		
		(0.000)		(0.001)		(0.348)		(0.001)		(0.002)			
Volume	b_{i6}	0.695		0.713		0.628		0.895	***	0.928	***	0.966	***
		(0.531)		(0.915)		(0.598)		(0.003)		(0.002)		(0.000)	
	$a_{ii} + b_{ii}$	0.914		0.923		0.941		0.955		0.980		0.990	

The table provides estimation results for the VAR-GARCH model outlined in eq.(1) and eq.(2). Reported coefficients are averages of the estimates for each individual stock with standard errors given in the parantheses below. *** denotes significance of the average coefficient estimates at the 1% level, ** at the 5% level, and * at the 10% level.

Table 3

Average Variance Error Decomposition results

MV Volume

Lag Period	Standard Error	MV Volume	Volatility	Abs. Order Imbalance	Bid-Ask Spread	Ave. Trade Size	Period Returns
1	2.207	43.737	0.507	8.863	0.047	46.827	0.001
2	2.246	44.112	0.551	9.084	0.418	45.796	0.002
3	2.270	44.457	0.583	9.190	0.461	45.241	0.003
4	2.275	44.469	0.589	9.210	0.522	45.116	0.003
5	2.277	44.467	0.592	9.215	0.544	45.068	0.003
6	2.277	44.457	0.593	9.214	0.557	45.048	0.003

Volatility

Lag Period	Standard Error	MV Volume	Volatility	Abs. Order Imbalance	Bid-Ask Spread	Ave. Trade Size	Period Returns
1	1.150	0.000	84.917	2.958	11.983	0.137	0.002
2	1.203	0.049	83.592	3.173	13.036	0.141	0.005
3	1.255	0.058	82.874	3.070	13.847	0.140	0.005
4	1.274	0.062	82.419	3.066	14.300	0.140	0.006
5	1.286	0.064	82.172	3.049	14.562	0.139	0.006
6	1.293	0.065	82.026	3.042	14.714	0.139	0.006

Abs. Order Imbalance

Lag Period	Standard Error	MV Volume	Volatility	Abs. Order Imbalance	Bid-Ask Spread	Ave. Trade Size	Period Returns
1	1.034	0.000	0.000	99.960	0.000	0.000	0.000
2	1.048	0.102	0.026	98.773	1.009	0.005	0.001
3	1.053	0.186	0.044	98.539	1.095	0.010	0.003
4	1.054	0.205	0.050	98.385	1.194	0.011	0.003
5	1.055	0.212	0.054	98.324	1.223	0.012	0.003
6	1.055	0.214	0.056	98.289	1.239	0.012	0.003

Bid-Ask Spread

Lag Period	Standard Error	MV Volume	Volatility	Abs. Order Imbalance	Bid-Ask Spread	Ave. Trade Size	Period Returns
1	0.440	0.049	0.027	0.002	86.720	12.972	0.231
2	0.491	0.087	0.038	0.004	84.191	15.365	0.314
3	0.517	0.092	0.039	0.005	82.379	17.187	0.299
4	0.529	0.095	0.039	0.005	81.298	18.264	0.300
5	0.535	0.097	0.039	0.005	80.610	18.951	0.298
6	0.538	0.098	0.039	0.005	80.187	19.373	0.297

Ave. Trade Size

Lag Period	Standard Error	MV Volume	Volatility	Abs. Order Imbalance	Bid-Ask Spread	Ave. Trade Size	Period Returns
1	2.347	0.000	48.479	0.001	47.965	0.176	3.380
2	2.358	0.083	48.116	0.002	48.224	0.204	3.372
3	2.366	0.098	47.824	0.002	48.495	0.216	3.365
4	2.367	0.112	47.794	0.002	48.511	0.218	3.363
5	2.367	0.117	47.783	0.002	48.516	0.219	3.363
6	2.367	0.120	47.780	0.002	48.516	0.219	3.362

Period Returns

Lag Period	Standard Error	MV Volume	Volatility	Abs. Order Imbalance	Bid-Ask Spread	Ave. Trade Size	Period Returns
1	1319.50	0.000	0.000	0.003	0.002	0.001	99.993
2	1319.71	0.002	0.002	0.003	0.003	0.002	99.985
3	1320.00	0.002	0.008	0.004	0.004	0.003	99.975
4	1320.01	0.003	0.008	0.004	0.004	0.003	99.974
5	1320.01	0.003	0.008	0.004	0.004	0.003	99.973
6	1320.01	0.003	0.008	0.004	0.004	0.003	99.973

The table provides results for the variance error decomposition relating to the VAR model specified in equation 1 (the results of the model are reported in Table 2).